

Serial No.: 10/068,364

PATENT APPLICATION
Docket No.: NC 82,621

REMARKS

Claims 1-18 and 21-44 are pending in the application. No claims are presently allowed.

Claim 1 is amended to clarify that the composite comprises a mixture of matrix material and transfer material. Support for this amendment is found in paragraph 0060, lines 3-5. The claim is also amended to cancel the erroneous extra word "comprises."

Claim Rejections – 35 U.S.C. § 103

Claims 1-7, 13-18, and 22-44 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Joyce, Jr. et al., US 5,292,559, in view of Baer et al., US 6,495,195, and Mayer, US 6,159,832.

Claim 1 is directed to a method for laser deposition. Laser energy desorbs a portion of a composite at a defined target location on a target substrate. The composite comprises a mixture of matrix material and transfer material. The desorbed composite is deposited onto a receiving substrate.

In order to make a *prima facie* case of obviousness, each claim limitation must be disclosed in the references. Claim 1 as amended recites a mixture of transfer and matrix materials. Thus both materials are found throughout the thickness of the composite coating on the target substrate.

Joyce discloses a method of laser transfer using a laser transparent substrate with a laser absorptive polymer film and a metal containing composite on the film (abstract). The film is a multi-layered composite comprising laser absorptive polymer 12a, gold 12b, nickel 12c, and gold-flash 12d (Fig. 2 and col. 4, lines 32-59). Joyce discloses discrete layers of separate materials that are not in a mixture. This present limitation is not disclosed in Joyce.

Baer discloses a process for transferring tissue to a thermoplastic film by melting the film with a laser and adhering the tissue to the melted film (col. 1, lines 26-35). Baer does not disclose a mixture of a transfer and matrix materials.

The process of Baer is entirely different from the presently claimed process. In Baer, the laser interacts only with the film, not with the tissue. This is not a laser transfer process, but rather a laser interaction with a polymer film which induces a morphological change in the polymer, which then results in an adhesion process between the biomaterial and polymer. The only transfer occurs when the film is peeled off of the sample and the adhered tissue goes with

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the film. In the present invention, the composite transfers through space/air in a free-flight manner. In Baer, the tissue is attached to a surface at all times. Also, in Baer, there is no matrix material that is desorbed by the laser.

Mayer discloses a laser transfer process where an ultrafast laser pulse vaporizes a metal film on a transparent substrate. The vaporized metal resolidifies on a working substrate (abstract). Mayer does not disclose a mixture of a transfer and matrix materials, but only pure metal layers, or possibly multiple metal layers as in Joyce (col. 7, line 66-col. 8, line 1). As none of the references discloses the limitation, a *prima facie* case of obviousness has not been made.

Claims 2-7, 13-18, and 22-44 depend from and contain all the limitations of claim 1 and are asserted to distinguish from the references in the same manner as claim 1.

Further, as to claims 25-32, these claims are to transfers of biomaterials, including living or active biomaterials. Such materials would be expected to be completely destroyed if vaporized using the methods of Joyce or Mayer, due to the high laser energy used. For example Joyce mentions that a range of 8-12 J/cm² should be used (col. 5, line 42). Mayer mentions about 60 J/cm² (col. 4, lines 59-67: 0.17 μ J over 6 μ m diameter spot) and even 350 J/cm² (col. 5, line 8). The present application states a typical range of 50 to about 200 mJ/cm² (0044), although the claims are not limited to this range. The energies in Joyce and Mayer may be hundreds of times that used in the present invention to transfer biomaterial. Further, in Joyce, the transferred material slams into the substrate at a pressure of 15-20 kbars (col. 3, lines 30-32). At such extreme energies and pressures, the biomaterial would denature, die, or be completely vaporized and the process would be useless. Claim 26 recites that the biomaterial remains living or active on the receiving substrate.

As to claims 37 to 44 to microarrays comprising certain biomaterials, none of the references disclose such microarrays.

There is no motivation to combine Baer with either Joyce or Mayer and no reasonable expectation of success of the combination as the processes are incompatible with each other. They expose different elements to laser beams that approach from opposite directions. There is nothing in the references to suggest that the tissue of Baer could be transferred intact according to the methods of Joyce or Mayer, or that it could remain living or active.

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Claim Rejections – 35 U.S.C. § 103

Claims 8-12 and 21 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Joyce, Baer, and Mayer, and further in view of Ross, US 5,743,560.

Claims 8-12, dependent on claim 1, are directed to laser-machining of the receiving substrate and/or the deposited transfer material. Claim 21, dependent on claim 1, is directed to a non-planar receiving substrate. Ross discloses laser-texturing of a metallic layer deposited on a glass substrate (Abstract) and laser-texturing of a glass substrate (col. 2, lines 10-12).

Claims 8-12 and 21 depend from and contain all the limitations of claim 1 and are asserted to distinguish from Joyce, Baer, and Mayer in the same manner as claim 1, in that the references do not disclose a mixture of transfer and matrix materials. Similarly, Ross does not disclose such a mixture.

Claim Rejections – Double Patenting

Claims 1-18 and 21-44 have been provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over copending Application No. 10/068,364. This is also the present application. By telephone interview of 08/23/2004 with Examiner Fuller, it was determined that the rejection is over Application No. 10/068,315. A terminal disclaimer over 10/068,315 is attached, without admitting any obviousness of the present invention.

In view of the foregoing, it is submitted that the application is now in condition for allowance.

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Respectfully submitted,



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